## III.—DALTON: HUMAN PHYSIOLOGY.

A TREATISE ON HUMAN PHYSIOLOGY; DESIGNED FOR THE USE OF STUDENTS AND PRACTITIONERS OF MEDICINE. By Jno. C. Dalton, M. D., Professor of Physiology and Hygiene in the College of Physicians and Surgeons, New York, etc. Sixth edition, revised and enlarged, with three hundred and sixteen illustrations. Philadelphia: 1875. Henry C. Lea. 825 pages. Chicago: W. B. Keen, Cooke & Co.

The previous editions of Dalton's Physiology have deservedly held a high place in the esteem of the medical profession. Its appearance in this new edition, revised and enlarged fully fifty per cent. in size, will not decrease its reputation, or the favor in which it is held as a text-book on the subject. It is as pleasantly and ably written, and much more profusely illustrated than the former editions, and with the new matter which it contains, very nearly up to the present condition of physiological science.

There is, however, scarcely any subject of medicine on which it is more difficult to supply an adequate text-book than physiology. The indefiniteness of many of the results of even the most painstaking and thorough researches, and those also on special subjects of the highest importance, and the general intricacy and complexity of many of their relations, render it almost impossible to produce any comprehensive manual that is at once full of positive facts and fully up to the latest information in regard to its theme. On these accounts a perfectly satisfactory treatise on physiology is hardly to be expected. A mere rudimentary handbook, giving in the briefest manner the main outlines of the study, may be very complete in its way, and perhaps may even surprise us by its accuracy and comprehensiveness, since in such a work but little is expected; but a larger manual like the present one, going to a considerable extent into details, and aiming not only to show results but also how they were obtained, is nearly always disappointing in some respects. Its very excellencies often serve to make its deficiencies more striking.

What has just been said of physiology in general is especially true of the physiology of the nervous system. No work on physiology in the English language has, in our opinion, done justice to this part of the subject, and the present volume, though superior to nearly all its predecessors, is still deficient in this respect. It is the duty of an honest reviewer to notice the faults as well as the merits of the work under examination, and in our notice of Dr. Dalton's manual, in its new and enlarged form, we shall have to call attention to numerous deficiencies, while speaking of its excellencies in most respects.

The arrangement of this new edition of Dr. Dalton's Physiology is the same as in the previous ones. First, after an introductory chapter, in which the plan of the work is laid down, we have a section on the nutrition of the body, beginning with a description of the proximate principles or prime constituents of the human body, including a chapter on foods, followed by the subjects in separate chapters, of digestion, absorption, the bile, the glycogenic function of the liver, the blood, respiration, animal heat, the circulation of the blood, the lymphatic circulation, and the urine. This section makes up nearly one-half of the work, and is throughout valuable and very full. The most notable omission that we observe is that of the chapter on the spleen which was contained in the former editions, and which it seems to us might have been retained, at least in substance, with advantage. Our knowledge of the functions of this organ is certainly greater now than when the earlier editions were published, yet we find no mention of it whatever, either in connection with the blood or elsewhere, in the present volume. It seems, like some similar structures of the body, to have been passed over in silence, perhaps on account of uncertainty as to their physiological functions, though since the experiments of Tarchanoff and others this is hardly true to the same extent of the spleen as of some of the others, such as the suprarenal capsules and thyroid gland. Its total omission here seems to us a blemish to the book.

Other points that seem to us to call for criticism in this generally very satisfactory portion of the work, are the omission of all reference to the nervous apparatus of some of the different organs concerned in the nutrition of the body. Thus no account is given of the nervous apparatus of the salivary glands when speaking of those organs, though farther on in the book, when treating of the sympathetic nervous system, a brief statement is made of some of the facts. So, likewise, the important subjects of the hepatic innervation, that of the intestines and that of the heart are left untouched in this their proper place. In regard to this latter, while the inhibitory function of the pneumogastric is pretty fully described, later, when speaking of that nerve, the book contains no mention, either here or elsewhere so far as we have been able to discover, of the intrinsic nervous apparatus of the heart, or of its relations with the sympathetic, both matters of the highest practical importance, the complete omission of which, in a work of this size and kind, is rather inexcusable.

The chapter on animal heat is in the main a satisfactory statement, but the part played by the nervous system is slurred over with the remark that the experimental evidence of its action is yet incomplete, and its mode of operation comparatively obscure. The experiments are certainly, in our opinion, complete enough to justify a more positive opinion than that expressed by the author, that "it is possible that certain influences transmitted through the nerves may also have the power of controlling directly the molecular activity of the tissues, and may thus diminish the amount of internal heat at the source of its production," which actually conveys a false impression as to the facts to the student using this work as a text-book. The labors of such experimenters as Claude Bernard, Naunyn, Quincke, Tscheschichin, Wood, and others, no matter how we may try to interpret them, have sufficiently established the fact that the influence of the nerves and nerve centres is really active in the regulation of animal heat; not to speak of the clinical experience of every observing practitioner, bearing witness to the same fact.

The second section of the work, that devoted to the nervous system, its arrangement and mechanism, is a vast improvement over what was contained in the previous editions. In many respects it is superior to anything on the subject heretofore published in the English language, that is, in a manual like the present one. Dr. Dalton, in his descriptions of the principal parts of the nerve centres, has closely followed the works of recent German writers, especially Henle's "Nervenlehre," a few of whose illustrations are reproduced. A careful study of this portion of the work will, better perhaps than any other recent general English or American work, enable the student to comprehend the character of recent discoveries and advances in the physiology of the nervous system. The ordinary text-books on descriptive anatomy used in this country are not nearly so clear and full, and in this respect alone Dr. Dalton has rendered a very valuable service. We think that we do not misstate the facts if we say that the average ignorance in the medical profession in this country is largely concentrated on the nervous system, its anatomy and physiology, and we are glad therefore that Dr. Dalton has by the fullness of this section of his work made this deficiency less excusable.

In the beginning of this section, in his first chapter, the author gives his definition of the functions of the nervous system—that it is "to associate the different parts of the body in such a manner that stimulus applied to one organ may excite the activity of another." We seriously question the correctness of this definition, as a complete statement of the case. Our reasons seem to us valid, but the character of the present notice will not permit us to fully discuss them here.

The chapters on general structure and functions, and nervous irritability, are on the whole very full and as satisfactory as could be expected on such a subject, our knowledge of which is as yet so incomplete. Considering how much our information on these subjects is due to microscopic research, the methods of which are so defective, comparatively speaking, and the results consequently so imperfectly established, it would seem that Dr. Dalton has departed to some extent from his policy of caution, so noticeable elsewhere, of stating only what is absolutely known, especially in his anatomical descriptions. There are differences of opinion in regard to some of the points he mentions the ultimate terminations of nerve fibres in the periphery for example, and the opinions he does not give may be as worthy of adoption in some cases as those he states. This, perhaps, is hypercriticism ; but it is suggested by the non-committal position of the author in regard to many other questions not more in dispute.

The chapter on the spinal cord, which follows, is on the whole, good, but nevertheless is faulty in several of its details. For example, in the beginning of the chapter the author quotes Koelliker and Gerlach as stating that the white substance of the cord diminishes gradually from above downwards, and says that this agrees with the known physiological relations of the parts, the gray matter acting as a nervous centre and the white as a route of communication with parts above. This statement is loose and defective in more than one respect ; in the first place the gray matter has another function than that of a nerve centre : it seems, also, to be the principal route of sensory transmission; and secondly, the function of the white substance is very imperfectly described by calling it a route of communication with parts above. Moreover, the statement that it gradually decreases in volume from above downward, though true of it as a whole, is yet only true of the lateral columns, the anterior and posterior columns keeping about the same dimensions throughout, or actually increasing, as at the lumbar enlargement. This fact was pointed out by Stilling, in 1857, and is well shown in his tabular statements given on page 453 of the third part of his great work on the structure of the spinal cord. It is specially significant in regard to the physiology of these lateral columns, which Meynert places in his second projection system as a route of transmission to the spinal centres in the central gray matter of the cord from the basal ganglia of the brain, and *vice versa.* This seems to have been entirely overlooked by Dr. Dalton.

Again, in another place we find our author saying that "the white substance of the cord, at least in the lateral columns, is partly made up of fibres which come from the nerve roots ; but the greater part of both anterior, lateral and posterior columns may consist of fibres which originate in the gray matter, and thus form secondary tracts of communication between it and the brain." The latter part of this quotation appears to us to be another loose statement, even guarded as it is by the word "may," and it is inconsistent with another paragraph, a little farther on, in which the author favors the view that the posterior columns are made up of longitudinal commissural fibres from one point of the central gray matter to another, and gives some very good reasons in its support.

Then again, the gray matter is said to be the route of sensory transmission, and no mention is made of any other possible route. Yet in the preceding paragraph it is stated that after the continuity of all the white substance is destroyed, sensibility is diminished in intensity, though preserved. We have already mentioned the reference of the lateral columns to his second projection system by Meynert, which includes the inference that they act in part for centripetal conduction, and notwithstanding the objections that have been raised and with all the caution that should be exercised in the estimation of the facts and experiments published, it seems to us by no means clear that they have not a share in this function. The experiments of Schiff and others, and the more recent very elaborate ones of Woroschiloff, seem to indicate that this may be the case, thus rendering Dr. Dalton's statement incomplete, if not exactly erroneous. Vulpian has stated the objections that may be offered to any positive decision either way in regard to this question, in his late article on the spinal cord, in the *Dictionnaire Encyclopedique*, which our author apparently, does not quote, and his course would have been the safest one to have adopted.

Dr. Dalton makes no mention anywhere of the theory of the arrangement of the nervous system of Meynert, whose views have not only in many respects a good amount of physiological probability, but also accord well with many of the results of clinical observation. They are certainly worthy of mention, as are also those presented by Luys, in a manual of physiology like the one under review, and we regret their omission. A brief statement of the principal features of the systems of these authors, given in the clear and readable style of Dr. Dalton, would have been a real service to his readers.

There is no mention in this chapter on the spinal cord of any of the special spinal centres, except that for the bladder, which is noticed in a description of the influence of the cord upon the sphincters. Hence, as a matter of course, the description of its functions is incomplete in this respect.

There are other points in this chapter that are open to criticism, but for the most part it is a careful and reliable statement of the principal facts known in regard to the physiology of the cord. In his descriptions of the finer anatomy, the author principally follows Koelliker, Gerlach, and Henle, in this and the other chapters on the nervous system.

The chapter on the brain is, in the main, correct in what it contains, but is defective in that some points are inadequately treated or left untouched altogether. In others it is, for a work of this kind, very satisfactory; thus the description of the convolutions is quite full, and that of the internal arrangement of the cerebral hemispheres and the basal ganglia is correct, and up to the later results of investigations. Some account is given of the phenomena of aphasia and the recent researches on the motor functions of the cortex, which is good as far as it goes, and the same may be said of the remarks on the cerebellum and the tuber annulare. The account of the medulla oblongata is very defective and behind the times, and the summary of its functions in the concluding paragraph of the chapter is exceedingly unsatisfactory. Dr. Dalton says: "The medulla oblongata is accordingly the seat of reflex actions which are directly or indirectly connected with the immediate preservation of life, since it maintains the movements by which air and food are introduced into the interior of the body. It also presides over the immediate muscular combinations concerned in the production of the voice and articulation, and by this means establishes an intelligible communication with the external world." This is certainly an inadequate statement of the office of the medulla, allowing it only the control of the oral, laryngeal, pharyngeal and œsophageal muscles. No mention whatever is made in this connection, of the vaso-motor and other centres which are located in this portion of the nervous system.

The chapter which follows, on the cranial nerves, is of considerable length and quite thorough in the treatment of its subject. In describing the optic nerve, however, the author gives the usually accepted statement as to the semi-decussation of its fibres according to the Newton–Wollaston hypothesis, as a demonstrated anatomical fact, not mentioning any possibility that the decussation may be complete, as is held by some very high authorities, such for example as Brown-Sequard and H. C. Bastian. And while in our own opinion the hypothesis usually accepted is the one that has the greatest color of probability, we are not prepared to say that it is absolutely and anatomically demonstrated. The rest of the chapter on the cranial nerves calls for no special remark, though one or two points might perhaps be stated more fully.

The following chapter on the sympathetic system is, however, the most defective in the book. Its faults are not so much in what it contains as in what it omits, and a negative defect in a subject like this, and to the extent we find it here, is a very serious and positive one. There is hardly any part of the nervous system that, within the past ten years, has been the subject of more investigations, or in regard to which more has been published, and the result has been many corrected theories and some positive additions to the sum of our knowledge of the subject. Yet from perusal of the chapter given in this book, one would scarcely know that anything had been done of late years—it is clear behind the times in almost every respect. In the first place it only comprises ten pages, less space than is given to the consideration of the facial nerve or the pneumogastric, and the same space as was given to the subject in the earlier editions, though the difference in the type makes this chapter the longer. This brief and inadequate notice at the present time, when such works as that of Vulpian, lately issued, are appearing, to say nothing of the valuable earlier works and the numerous articles and monographs in nearly every language, and by the highest authorities in physiological science, is an exceedingly unfortunate mistake on the part of the author of this manual. We must consider it an oversight of Dr. Dalton, that this subject was not more fully treated, for we cannot imagine that an accomplished physiologist could so underestimate its physiological importance, much less be ignorant of the facts. We have already noticed the omission of mention of the vaso-motor centres in the cord ; they are also entirely ignored in this chapter and elsewhere in the book, as is also the whole subject of trophic nervous action, which might perhaps be suggested in this connection. The impression that the reader would be likely to obtain from this chapter is that the sympathetic system is in its general arrangement and functions, largely independent of the brain and cord ; that its physiological properties and *rôle* are to a very great extent obscure or unknown ; and that a few facts which are given in regard to its influence on movement and sensibility, the special senses, the circulation, etc., comprise the sum of our knowledge in regard to it. No adequate idea is conveyed as to the real connections between the cerebro-spinal and sympathetic systems, and the influence of one over the other. As we have before said, the chapter is entirely behind the times, and the most defective in the whole volume.

The chapter on the special senses, which closes this section, is the longest in the book, and appears to give quite a good account of its particular subjects. We see that the author rejects the theory of a special muscular sense while he admits the existence of sensations of temperature and pain. In this rejection of the muscular sense we are compelled to disagree with him.

The third and last section is devoted to the function of reproduction, and gives a very clear and quite a full description of this subject, which, in many of its details, is so difficult to be understood by the student. In this notice of Dr. Dalton's work we have given our attention especially to the parts relating to the nervous system, first, because we deem it and its functions the most important in the body, and secondly, because it comes more within the particular province of this journal than the other organs and their functions. We are very far from considering that a manual of physiology should be altogether or even chiefly devoted to the nervous system, and our notice of the deficiencies of the volume before us are not at all grounded on such a view. In many respects it gives a fuller and more adequate description of the physiology of the nervous system than any of its predecessors. In others, however, and we have tried to point them out, it is deficient both in accuracy and completeness.

As a whole, we can cordially recommend the work as a textbook for students, and as one of the best. There is still need, however, for a higher kind of work and more literary activity in the preparation of a manual such as this one, than it displays, good as it is in very many respects. We trust that in future editions the accomplished author will bring it still nearer to what such a work should be.

Of general criticisms we have scarcely any to offer. The adoption of the metric, or, as it is here called, the centigrade system of weights and measures, may be considered as a defect by some. We are not sure that it is so; if this legalized system is ever to be adopted, a beginning must be made, and it has its advantages. Its introduction here is a kind of experiment, but we do not consider that it at all affects the value of the book.

## IV.—PAGET: CLINICAL LECTURES.

CLINICAL LECTURES AND ESSAYS. By Sir James Paget, Bart., etc. Edited by Howard Marsh, F. R. C. S. New York: 1875. D. Appleton & Co. Chicago: Hadley Bros. 8vo. 428 pages.

This work contains a series of lectures and addresses, the greater part of which have previously appeared in medical journals and other periodical publications. They are very pleasantly written, and as might be naturally expected from the name of their author, they are likewise able and instructive. They read indeed like some popular lectures, while containing matter valuable at once to the student and to the medical man in practice.

As might be expected, the subjects of this book are mainly surgical, but they nevertheless overpass in some places the limits that are usually assigned to this department of medicine. The last chapter, indeed, entitled "Notes for the Study of Some Constitutional Diseases," would not seem to come specially under this head, and the same might be said of the third "On stammering in other organs than those of speech."

The special nervous aspects of the various subjects treated of in this book are the ones that particularly claim the attention of this journal, and under this head we must notice three of the articles it contains more than the rest: they are the one just named on stammering, that on nervous mimicry, and thirdly, the essay on sexual hypochondriasis. The first of these calls attention to a peculiar class of cases, occasionally met with, in which there is either in the urinary organs, the œsophagus, or the intestine and rectum, an inco-ordination under certain nervous influences, which renders the special acts of urination, defecation or swallowing difficult at certain times or places. We say this chapter calls attention to these facts: it hardly does more, except perhaps to suggest the general line of treatment that should be adopted, based in the main on the resemblance between these affections and the embar-